

**ASC-TR-96-1000**

**LITELINE 360™ PRODUCT EVALUATION REPORT**

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**AD-A286 938**



Aeronautical Systems Center  
Weapons, Air Base and Range Product Support Office  
ASC/VXO  
314 W. Choctawhatchee Ave., Suite 104  
Eglin AFB, FL 32542-5717

3 January 1996

FINAL REPORT FOR PERIOD 8 DEC 1994 - 31 JUL 1995

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**AERONAUTICAL SYSTEMS CENTER**

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FOR THE COMMANDER



WADE H. GRIMM  
Program Manager

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13. ABSTRACT (Maximum 200 words) Final report of the commercial technology exploitation evaluation of the LiteLine 360™ portable light rope produced by Flexlite Inc. of Edison, New Jersey. The evaluation was conducted by the 325 CES, Fire Protection Division, Tyndall AFB, Florida and the 374 CES Fire Protection Division, Yokota Air Base, Japan between 8 Dec 1994 and 31 Jul 1995. This evaluation was part of a continuing program to explore commercial off the shelf technology for application to Air Force firefighting requirements. The LiteLine 360™ is an illuminated length of flexible tubing (100, 200, and 300 foot lengths) that can assist firefighters during ingress to a structure or aircraft and egress of injured or trapped personnel/passengers. The item was highly visible, even in dense smoke environments. It helped free both hands for fire and rescue operations where a flashlight/lantern normally would occupy one hand. The item enhanced fire/rescue capabilities and has been recommended for addition to table of allowance 490, making it available to Air Force fire departments worldwide.					
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## DEPARTMENT OF THE AIR FORCE

AERONAUTICAL SYSTEMS CENTER (AFMC)

EGLIN AIR FORCE BASE, FLORIDA

3 Jan 96

### MEMORANDUM FOR HQ AFCEA/CEXF

FROM: ASC/VXO

314 Choctawhatchee Ave., Suite 104  
Eglin AFB, FL 32542-5717

SUBJECT: LiteLine 360™ Product Evaluation Report  
(Ref: Test Plans, 14 Oct 94 and 30 Jan 95)

1. PURPOSE AND BACKGROUND. The purpose of this test was to assess the effectiveness and suitability of the LiteLine 360™ portable light rope manufactured by Flexlite Inc. The product is an illuminated length of flexible tubing that can assist firefighters during ingress to a structure or aircraft and egress of injured or trapped personnel and passengers from buildings, Air Force cargo and passenger aircraft. The goal is to provide illumination for firefighter activities as well as a marked escape route for all personnel. The evaluation was managed by the 325 CES/CEF at Tyndall AFB, Florida and 374 CES/CEF at Yokota AB, Japan between 8 Dec 94 and 31 Jul 95.

2. SYSTEM DESCRIPTION. The LiteLine 360™ is electrically powered from wall outlet, fire truck auxiliary generator, or battery source depending upon the version purchased. The 120 or 220 VAC units are available in 100, 200 and 300 foot lengths while 12 VDC units are available in 60 or 90 foot lengths and 24 VDC versions come in 120 and 180 foot lengths. The light rope uses long life (10,000 hrs) bulbs spaced 1 inch apart, encased in a 1/2 inch diameter waterproof PVC tube, weighing 12 pounds per 100 foot length. The bulbs are wired so that damage to one will only darken a 40 inch segment. The LiteLine 360™ normally has a single male end plug, but three 100 foot segments with end-to-end plug together capability were also evaluated. The LiteLine 360™ can be employed anywhere an extension cord would be used for a portable light. The line is normally stowed in a canvas bag and can be deployed trailing behind a firefighter or thrown ahead of him as one would deploy a life preserver. The 120 VAC units draw 4.5 amps in the 100 foot version, 9.3 amps in the 200 foot version, and 14 amps in the 300 foot version.

3. METHOD. The LiteLine 360™ was added to fire/rescue vehicles at both locations and used as appropriate during actual and training scenarios. Appropriate applications of the LiteLine 360™ were left to the resourcefulness of the respective fire/rescue units evaluating the product. Since the LiteLine 360™ is unlike any of the tools currently in the firefighters

inventory, uses, applications and techniques for employment is an evolving process. Methods and applications used varied between evaluation sites.

4. OBJECTIVES AND RESULTS. The following objectives were used to assess effectiveness, compatibility, reliability, maintainability, and availability of the LiteLine 360™ light rope when used to provide fire/rescue personnel assistance in structure and aircraft actual and training situations.

a. Objective E-1. Assess the effectiveness of the LiteLine 360™ to provide illumination and safe access to buildings and aircraft during training and emergency response scenarios. The measure of effectiveness is time saved getting portable lighting to the location of a fire/rescue and getting firefighter personnel safely into and out of the emergency environment. The criteria is not established. **Results:**

(1). Visibility of the LiteLine 360™ in even the most dense smoke filled environments was reported as incredible. It would illuminate the exit route, highlight other fire fighters to reveal their location/activities and aided in determining the location of injured or entrapped victims. During search and rescue operations it would not replace the use of portable flashlights/lanterns, but would enhance orientation in the fire/rescue surroundings and provide an unmistakable safe route of egress.

(2). During ladder operations, the 200 foot length would be attached to the top rung of a ladder. Once raised, the LiteLine 360™ provided more than adequate light for safe climbing on the ladder. For window or roof entry, several feet of the LiteLine 360™ would be pulled beyond the ladder to mark the exit location. When ventilation operations were conducted in roof areas, the LiteLine 360™ was superb to highlight the ventilation holes and prevent accidental entanglement.

(3). The LiteLine 360™ provided extremely effective illumination during cargo (C-5 and C-141) aircraft exercises. During fighter egress exercises the LiteLine 360™ was most effective in identifying entry control points, re-servicing areas and medical treatment areas. Due to the limited space in a fighter cockpit, flashlights were the preferred illumination device due to concern that the LiteLine 360™ could get entangled in an ejection handle or other cockpit levers/handles.

(4). The measure of time saved compared to traditional portable lighting was not an appropriate evaluation criteria. In fire/rescue scenarios, hand held flashlights/ lanterns are the typical source of illumination. While they are quick to deploy, they require constant attention (aiming) and by occupying one hand are a hindrance during victim removal and fire fighting operations. Although the LiteLine 360™ takes a couple minutes to fully deploy it provides much better illumination of the work area and operates unattended.

(5). The 100 foot LiteLine 360™ was too short for most scenarios, especially when the illuminated segment started at the vehicle (auxiliary generator). The 200 foot length was preferred as more useable for a variety of exercises. The ability to lengthen by addition of 100 foot segments as needed provided true flexibility to respond to nearly any situation. By using a separate extension chord, firefighters were able to place the beginning of illumination where it was most beneficial and not waste lighted segments outside a structure.

(6). The LiteLine 360™ was normally deployed from a rope bag and could tangle on itself. At low ambient temperatures, the LiteLine 360™ was initially stiff, but if it was plugged in just prior to deploying, it would warm sufficiently to be adequately flexible. Storage on a reel would provide smoother deployment, but the entire line must be removed from the reel to prevent damage from heat build-up of overlapping coils on the reel.

b. Objective S-1. Assess the compatibility of the LiteLine 360™ with the operational environment. Can the system provide timely response in an emergency scenario? Is there adequate power available from vehicles in the emergency response team to employ the light? What problems are encountered deploying the light rope? Does it interfere with any other equipment normally used in an aircraft or structure emergency response? The measure of effectiveness is a subjective evaluation of interoperability with other emergency response equipment and personnel. The criteria is not established. **Results:**

(1). The LiteLine 360™ could be fully deployed by a single individual in 1 to 2 minutes.

(2). The generators installed on vehicles are rated at 5200 watts, more than adequate for even a 300 foot LiteLine 360™ ( $120v \times 14a = 1680$  watts).

(3). Occasionally the power cable became unplugged from the power source which could be prevented by a "tie off" combined with a twist locking electrical plug.

(4). A hook at the end of the LiteLine 360™ would enhance deployment by allowing attachment to a ladder or the belt of a firefighter that leads into the interior of a structure or aircraft.

c. Objective S-2. Assess the reliability, maintainability, and availability (RM&A) of the LiteLine 360™. The measure of effectiveness is serviceability of the unit. The criteria is not established. **Results:**

(1). No electrical or maintenance problems were experienced by either evaluation site during the period of evaluation.

(2). The units are easy to clean with mild soap and water and retained a like new appearance.

(3). No nicks, cuts or severe abrasions in the PVC sheathing were noted by one site while only minor scratches and abrasions were noted at the other site after dragging through mud, paved roads and gravel.


(4). All bulbs were reported still operating at the end of the evaluation. A damaged unit with inoperative segments can be repaired by the manufacturer or a competently trained electrician (to maintain the waterproof characteristics).

5. CONCLUSIONS. The LiteLine 360™ provides much needed illumination during fire fighting operations in structures, aircraft and confined spaces. Although vehicle lights provide more illumination on structure exteriors, the LiteLine 360™ provides unique lighting of the interior environment with a glowing safety line. It can free both hands for other firefighting tasks while providing general lighting in the fire scene and a clear indicator of the escape route, even in dense smoke situations. The LiteLine 360™ should be purchased in 100 foot plug together segments (maximum of 300 feet based upon internal wiring) to provide maximum flexibility in a variety of scenarios. Acquired techniques such as coiling to increase light in a localized space and entwining a railing in stairwells enhances the utility of this tool. Users should employ the unit with an extension cord to avoid wasting illumination outside of a structure, aircraft or confined space.

6. RECOMMENDATIONS. This tool should be stock listed and added to Table of Allowance 490 as required. Suggested improvements include:

a. Some type of hook should be available for the end of the LiteLine 360™ to attach to ladders or belt loops. This can be a local modification to accomodate specific requirements.

b. Some form of marking such as arrows on the PVC of the LiteLine 360™ or sequential blinking lights toward the source, would allow a lost firefighter to know which direction he should follow to the exit. (Flexlite Inc. has upgraded their design with two green and a single red light at the end of every 40 inch segment. Red indicates the direction toward the fire and green indicates the direction toward the power source or egress direction.)

  
WADE H. GRIMM  
Program Manager

Attachment:

1. Product Illustration.
2. Distribution.



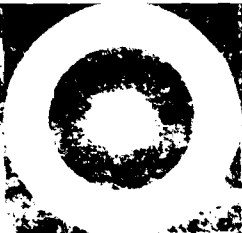
1st Ind to ASC/VXO LiteLine 360™ Product Evaluation Report

HQ AFCESA/CEXF

26 Jan 96

Concur/~~non-concur~~ with the recommendations in this report.

  
JAMES W. HOTEL  
Chief, Fire Protection Division



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USE DURING EMERGENCY AND SAVAGE AND OVERWHELMING

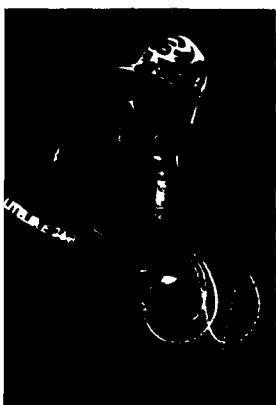


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## GOES EVERYWHERE WITH THE FIREFIGHTER.

LiteLine 360 is a breakthrough in firefighter safety. Lightweight, flexible, and easy to carry and deploy, LiteLine 360 is a light source that goes everywhere and lights everywhere it goes. Simple as a series of small bright lamps in clear PVC sheathing, it's tough enough for use in moderately hostile firefighting conditions. If the firefighter can be there, so can LiteLine 360.

Once deployed, LiteLine 360 becomes an *easy-to-follow route* to people and areas inside the structure. With it, firefighters can *move and work more quickly*. And most important, LiteLine 360 provides an *illuminated path of retreat*: it lights the way to safety.



flexible LiteLine 360 deploys in the go from available canvas bag.

## IMPROVES FIREFIGHTERS' ABILITY TO SEE

Light is critical to fire service operations. Now with LiteLine 360 firefighters can have better illumination for working in de-energized and smoke-infiltrated structures. LiteLine 360 furnishes a moderate ambient light level everywhere it's deployed. Rather than a limited point source and beam, it's a *continuous strand of omni-directional light*: helpful illumination in "360 degrees" around the source.

## A HIGHLY FUNCTIONAL PORTABLE LIGHTING APPLIANCE.

- **Goes everywhere** — Makes firefighter's job safer and easier during the crisis, during salvage-and-overhaul, and on search-and-rescue missions.
- **Carry while lit** — Provides illumination while advancing and immediately marks routes for quick travel in and out.
- **Compact and flexible** — Safe for use in close, confined areas.
- **Fast deployment** — Light whole areas just by draping along floor and over objects.
- **Non-ignition source of illumination** — Can be deployed in environments with flammable gasses
- **Omni-directional, "360-degree" light** — Better illumination for working in darkened areas, especially smoke-filled environments

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### FLEXLITE INC.

102 Fernwood Avenue  
Edison, NJ 08837

**Power Requirements:** 120 volt ac; standard heavy-duty fire service plug; use with generator or building power

**Water Shield Impact, Immersion, and Dielectric Withstand Tests:** Complies with UL 1571, 3rd Ed., as confirmed by ETL testing.

NOTICE: LiteLine 360 is a portable lighting appliance for firefighting and search-and-rescue applications; it is not intended for use as a rope for hauling or as a lifeline for tying on.

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